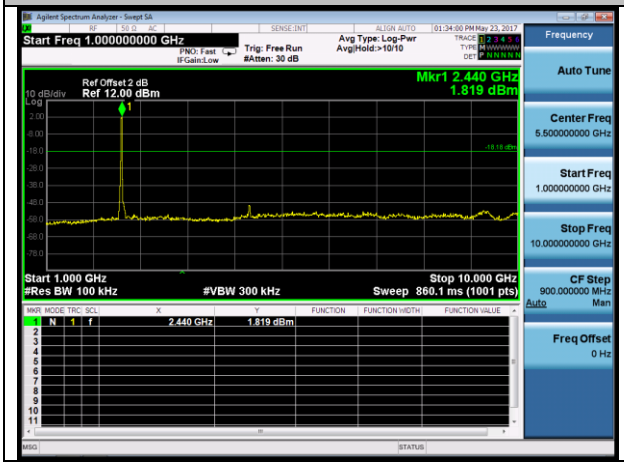
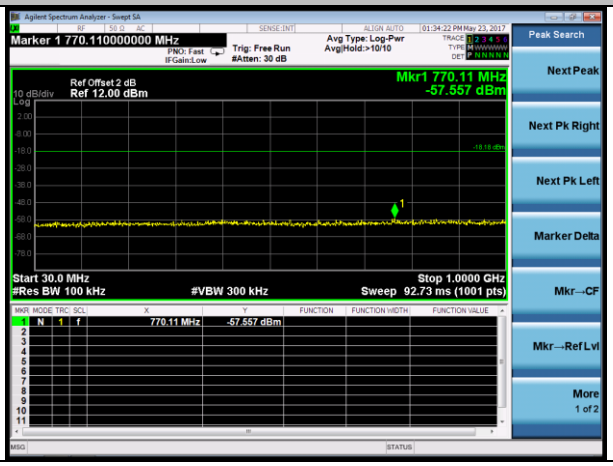
11G-MCH	11G-MCH
	
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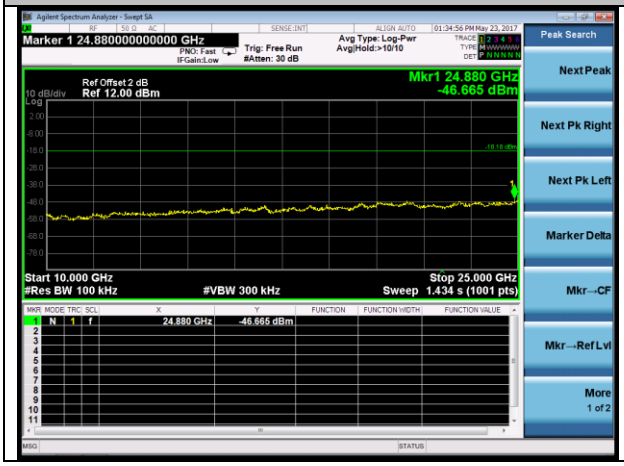	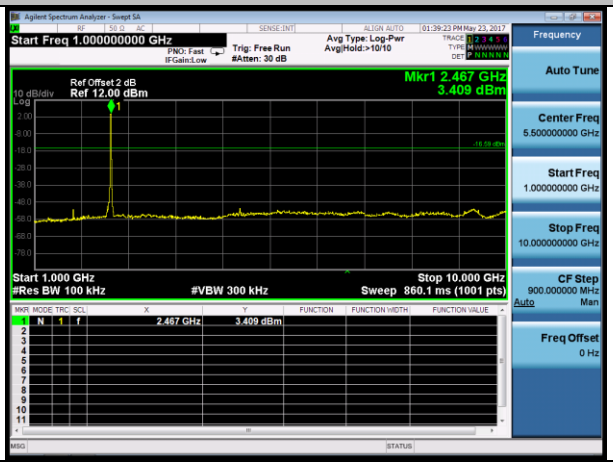
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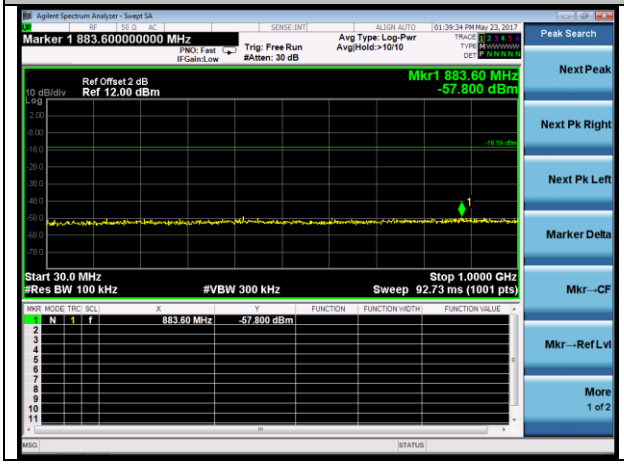
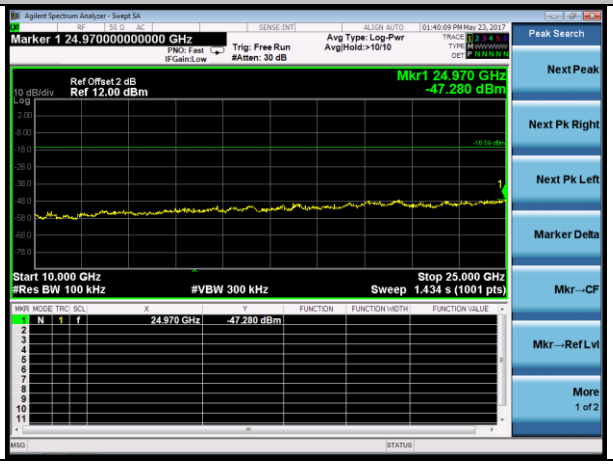
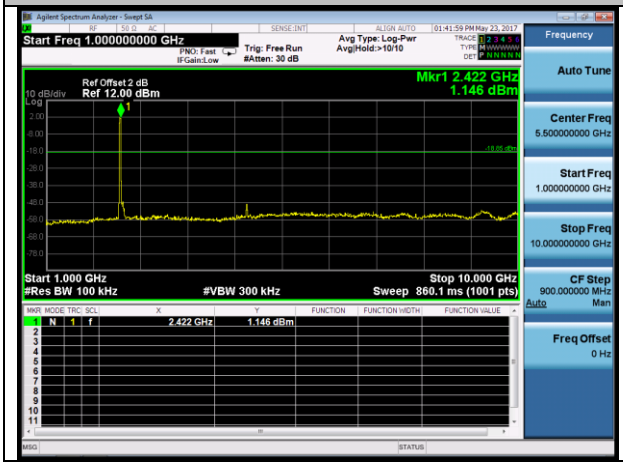
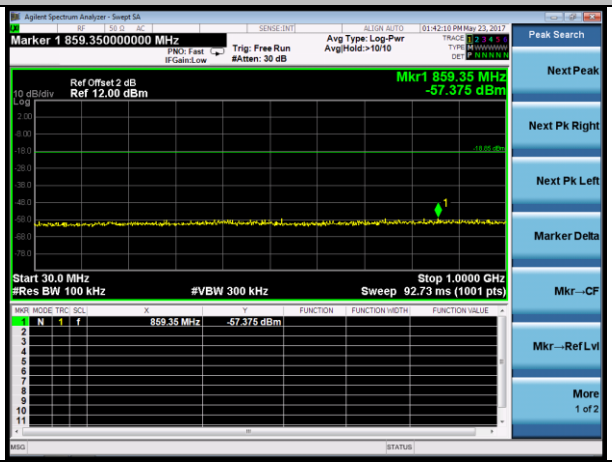
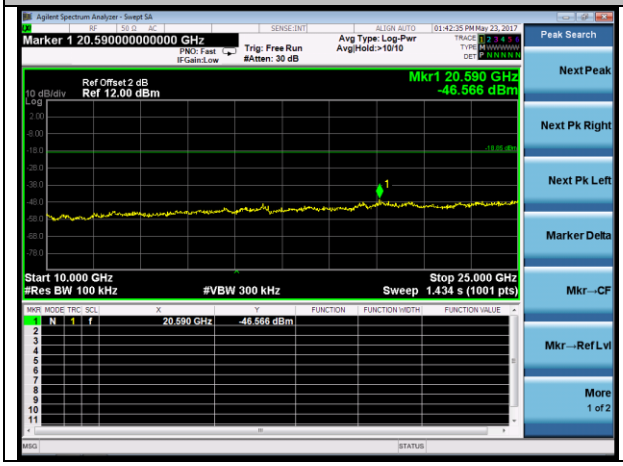
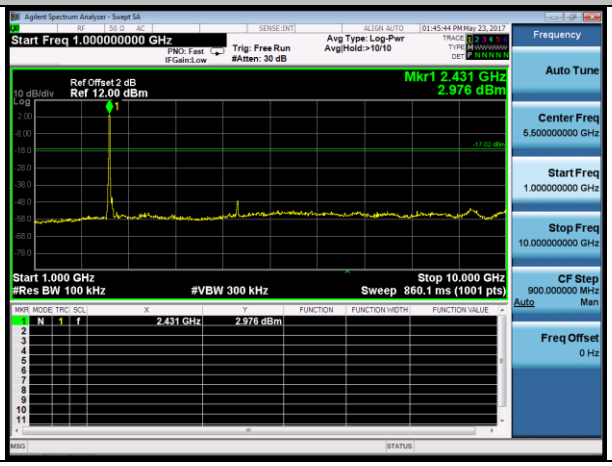
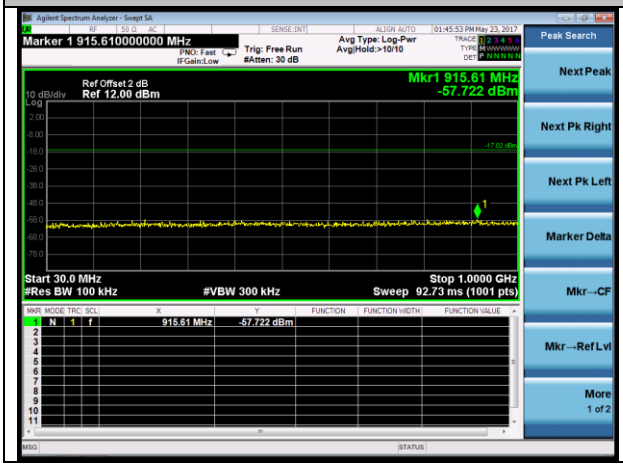
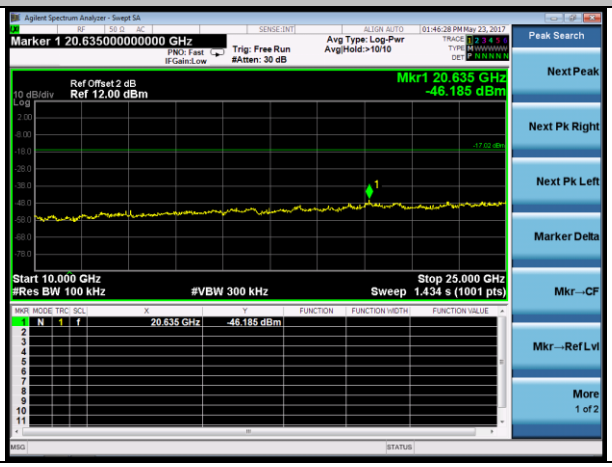
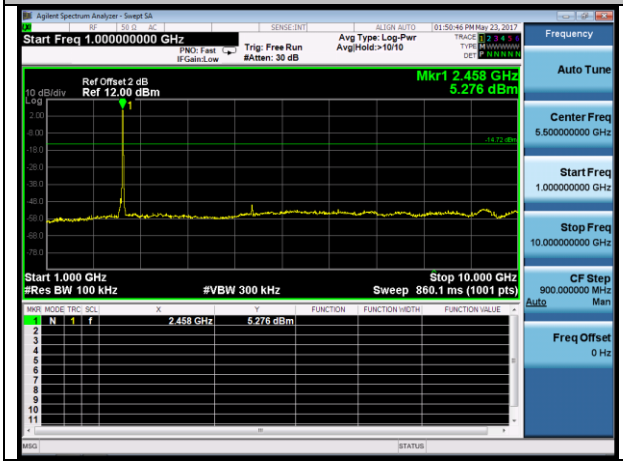
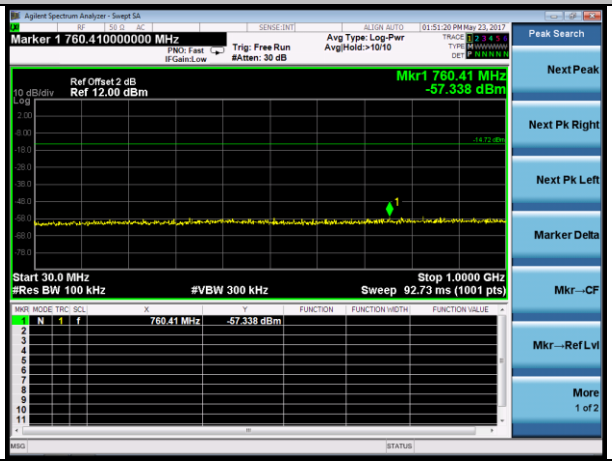
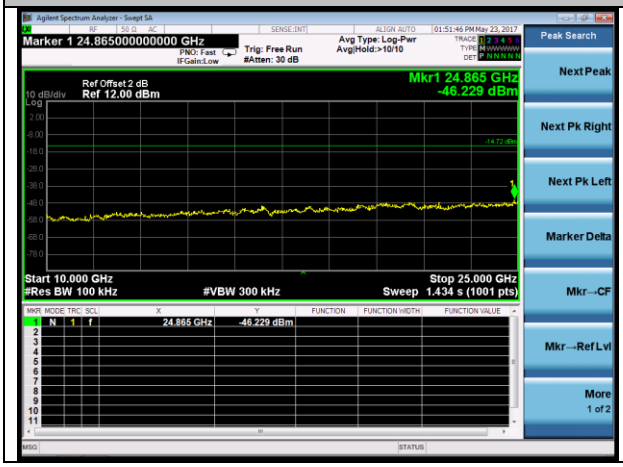
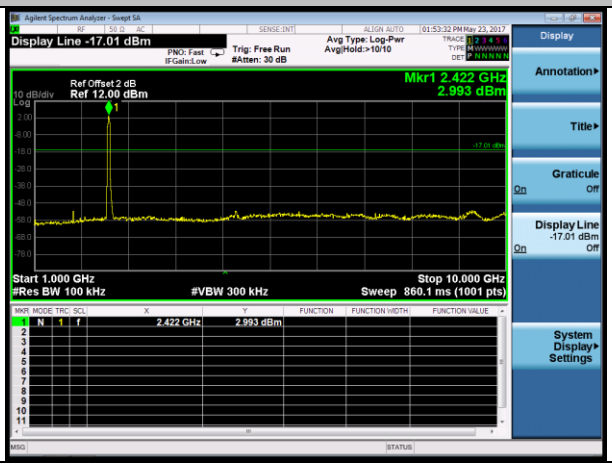
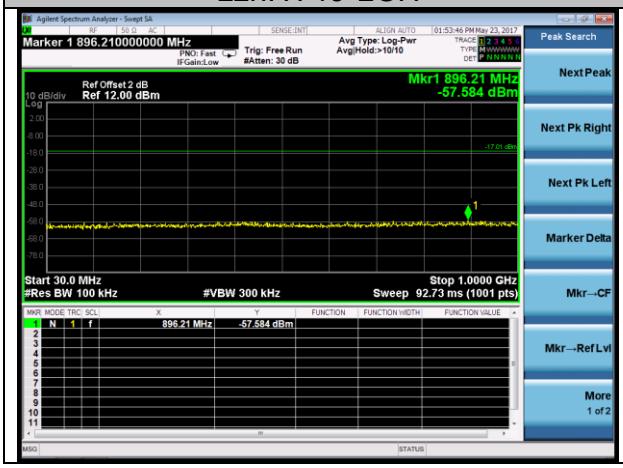
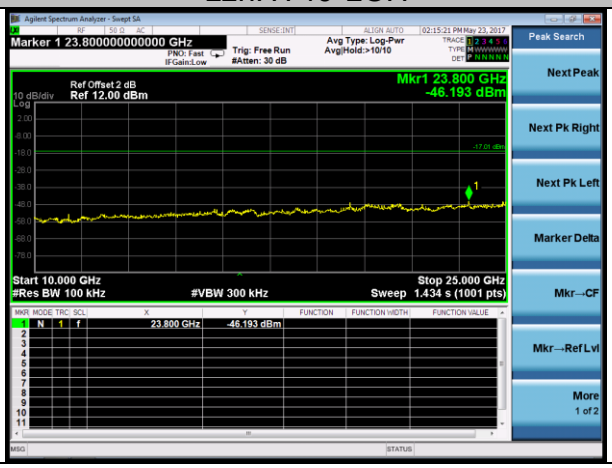
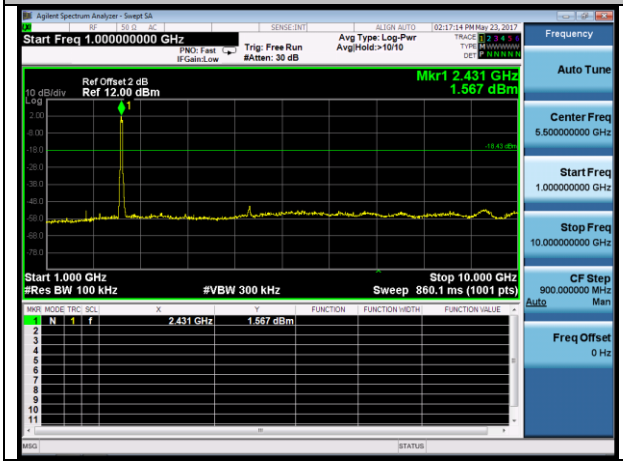
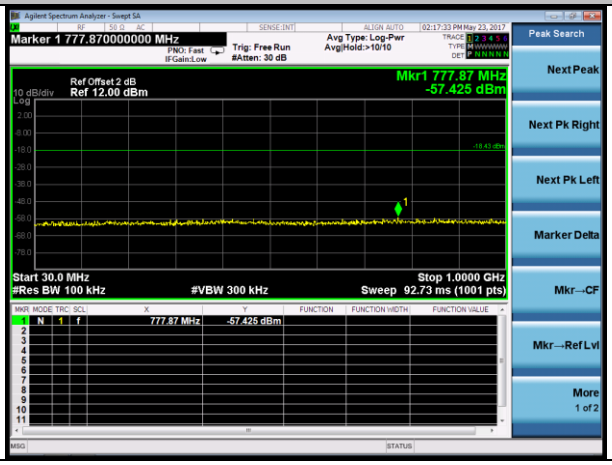
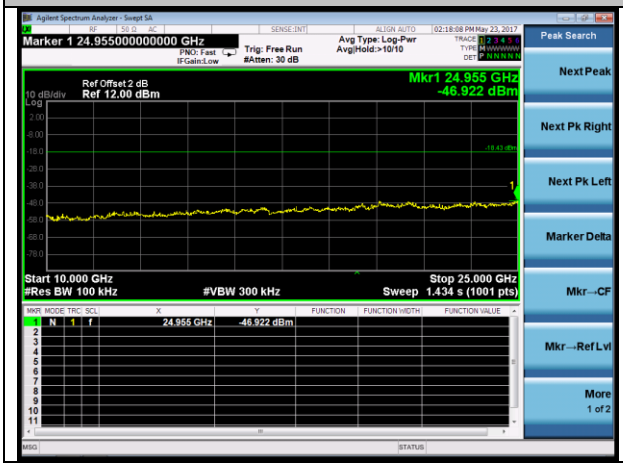
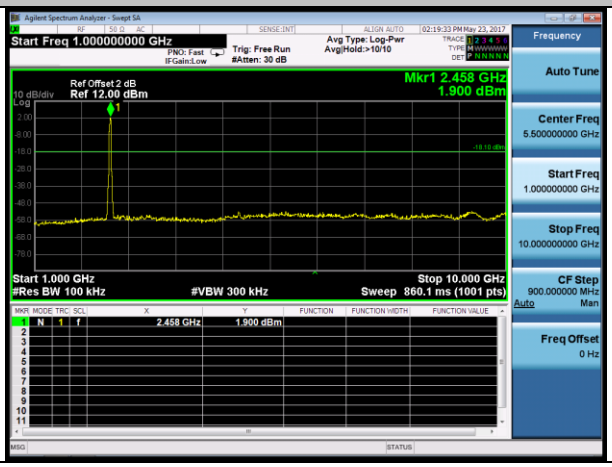
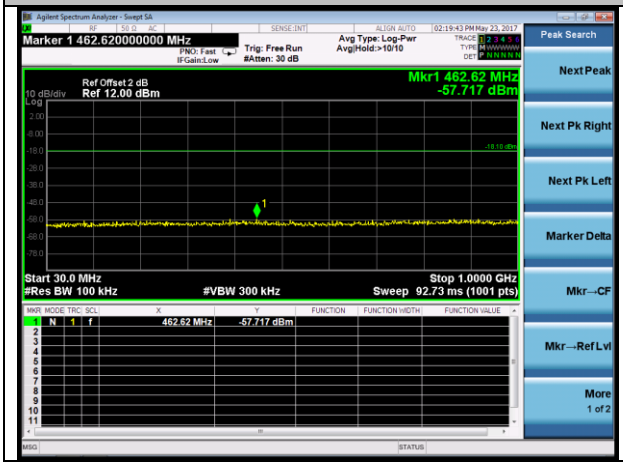
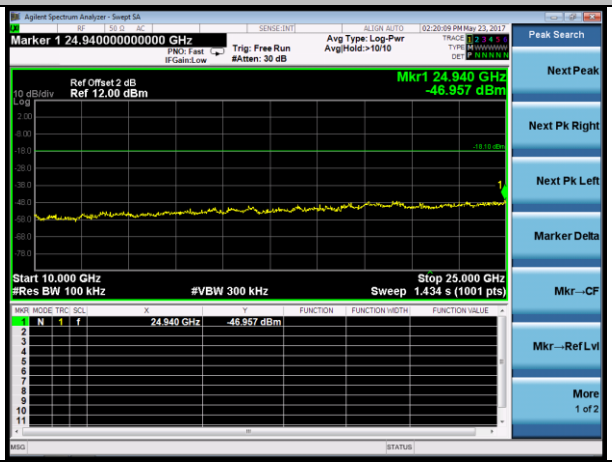
	

11nHT20-LCH	11nHT20-LCH
	
11nHT20-LCH	11nHT20-MCH
	
11nHT20-MCH	11nHT20-MCH
	

11nHT20-HCH	11nHT20-HCH
	

11nHT20-HCH	11nHT40-LCH
	

11nHT40-LCH	11nHT40-LCH
	

11nHT40-MCH	11nHT40-MCH
	
11nHT40-MCH	11nHT40-HCH
	
11nHT40-HCH	11nHT40-HCH
	

10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY

10.1 MEASUREMENT PROCEDURE

(1). Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator

(2). Set the EUT Work on the top, the middle and the bottom operation frequency individually.

(3). Set SPA Trace 1 Max hold, then View.

Note: The method of AVGPSD in the KDB 558074 item 10.3 was used in this testing.

10.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

Refer To Section 8.2.

10.3 MEASUREMENT EQUIPMENT USED

Refer To Section 6.

10.4 LIMITS AND MEASUREMENT RESULT

Mode	Channel	PSD [dBm/3kHz]	Limit[dBm/3kHz]	Verdict
11B	LCH	-6.030	8	PASS
	MCH	-5.644	8	PASS
	HCH	-6.941	8	PASS
11G	LCH	-12.296	8	PASS
	MCH	-10.328	8	PASS
	HCH	-8.836	8	PASS
11nHT20	LCH	-13.260	8	PASS
	MCH	-10.135	8	PASS
	HCH	-8.031	8	PASS
11nHT40	LCH	-11.965	8	PASS
	MCH	-12.846	8	PASS
	HCH	-12.295	8	PASS

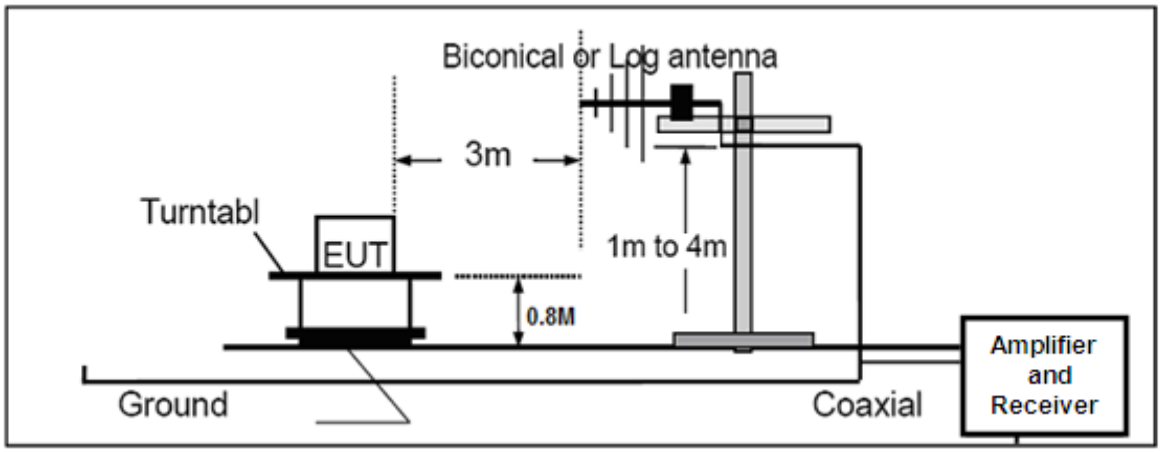
11. RADIATED EMISSION

11.1. MEASUREMENT PROCEDURE

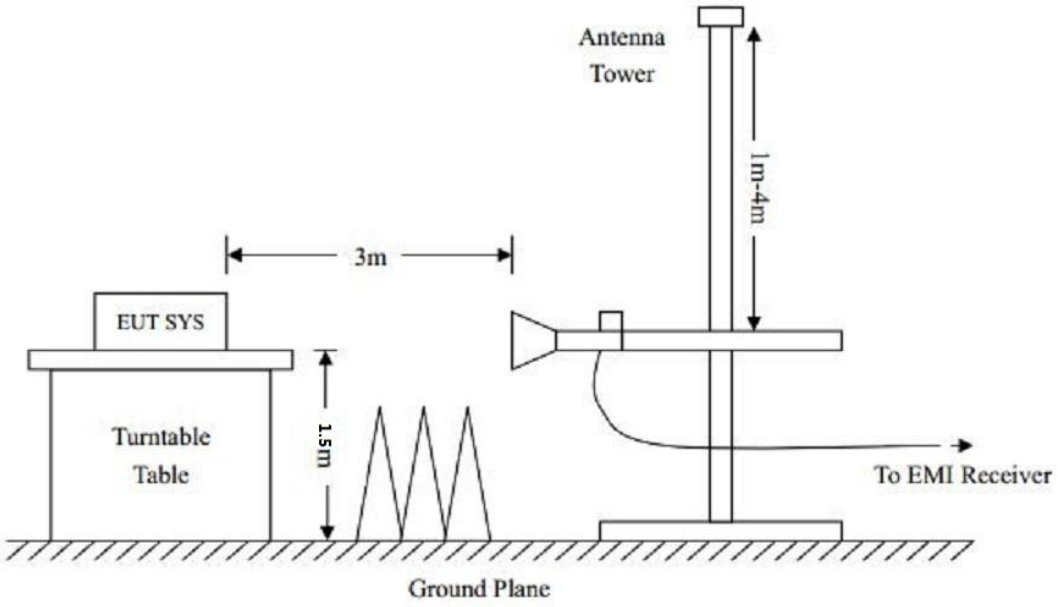
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

11.2. TEST SETUP

RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



11.3. LIMITS AND MEASUREMENT RESULT

15.209(a) Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Note: All modes were tested For restricted band radiated emission,
the test records reported below are the worst result compared to other modes.

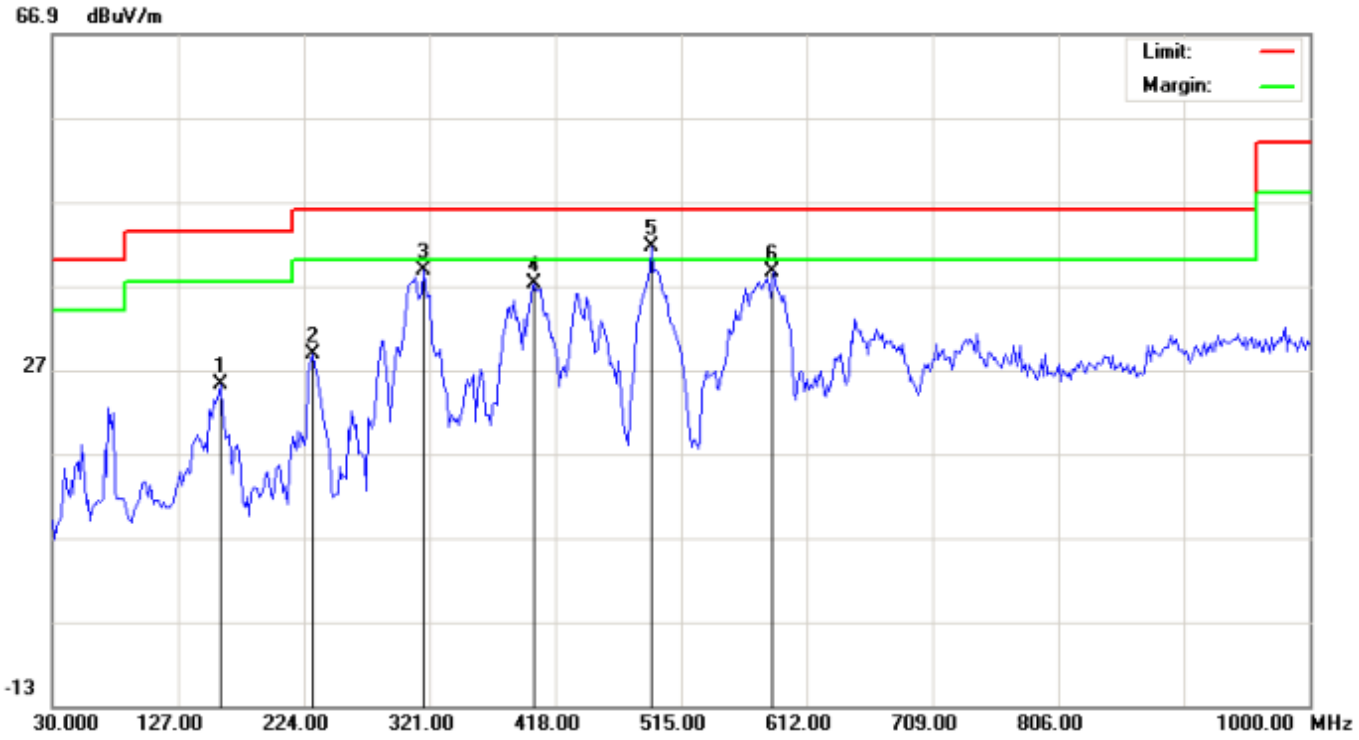
11.4. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz.

RADIATED EMISSION BELOW 1GHZ

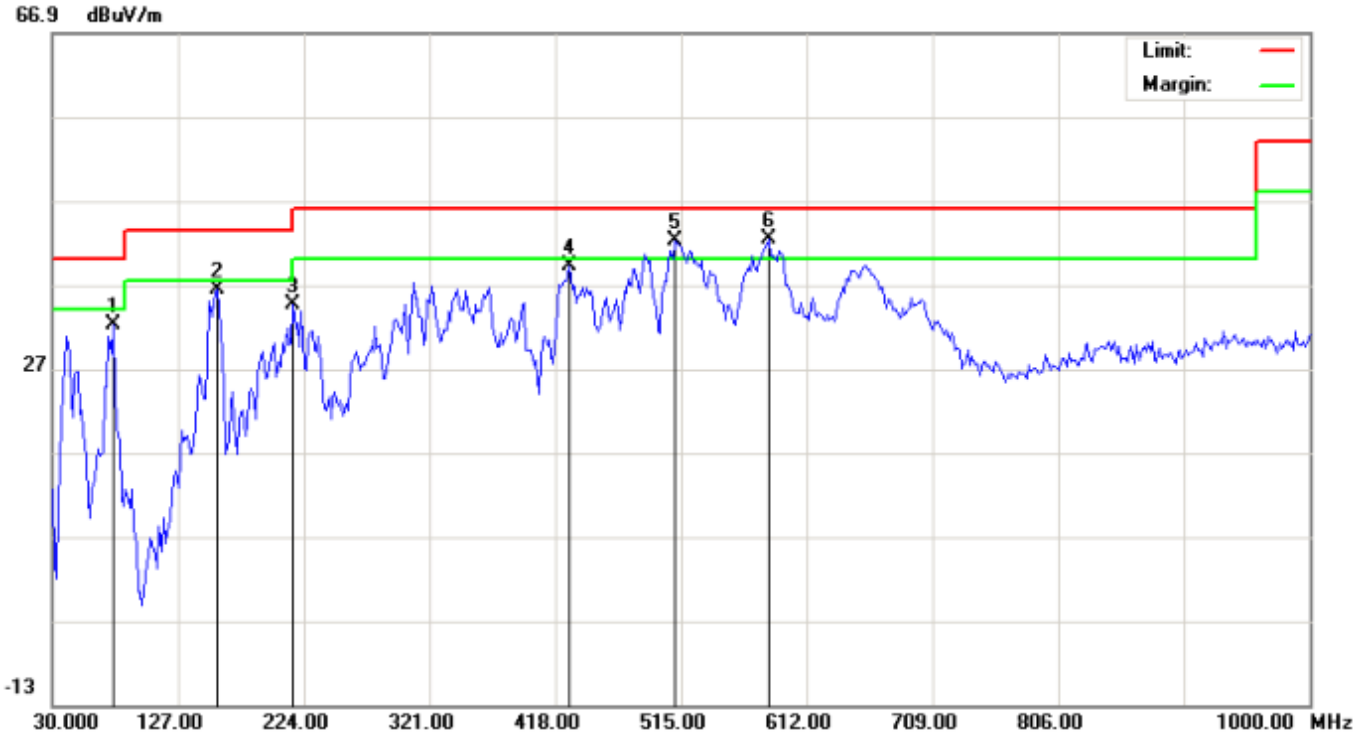
RADIATED EMISSION TEST- (30MHZ-1GHZ) -HORIZONTAL



No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		159.3333	14.79	10.49	25.28	43.50	-18.22	peak			
2		230.4667	19.92	8.89	28.81	46.00	-17.19	peak			
3		316.1500	22.32	16.49	38.81	46.00	-7.19	peak			
4		401.8333	18.16	19.13	37.29	46.00	-8.71	peak			
5	*	492.3667	20.53	21.05	41.58	46.00	-4.42	peak			
6		586.1332	15.22	23.38	38.60	46.00	-7.40	peak			

RESULT: PASS

RADIATED EMISSION TEST- (30MHZ-1GHZ) -VERTICAL



No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		76.8833	29.60	2.57	32.17	40.00	-7.83	peak			
2		157.7167	20.99	15.32	36.31	43.50	-7.19	peak			
3		215.9167	24.07	10.56	34.63	43.50	-8.87	peak			
4		429.3167	19.33	19.96	39.29	46.00	-6.71	peak			
5	!	510.1500	20.82	21.40	42.22	46.00	-3.78	peak			
6	*	582.9000	19.85	22.64	42.49	46.00	-3.51	peak			

RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss, Margin= Result -Limit.

2. The “Factor” value can be calculated automatically by software of measurement system.

3. All test modes had been pre-tested. The 802.11b at low channel is the worst case and recorded in the report.

RADIATED EMISSION ABOVE 1GHZ

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type	
TX 11b 2412MHz							
4824	40.73	10.44	51.17	74	-22.83	Pk	Horizontal
4824	30.62	10.44	41.06	54	-12.94	AV	Horizontal
7236	40.90	10.39	51.29	74	-22.71	pk	Horizontal
7236	30.96	10.39	41.35	54	-12.65	AV	Horizontal
4824	41.04	10.39	51.43	74	-22.57	Pk	Vertical
4824	28.79	10.39	39.18	54	-14.82	AV	Vertical
7236	41.63	10.68	52.31	74	-21.69	Pk	Vertical
7236	29.50	10.68	40.18	54	-13.82	AV	Vertical
TX 11b 2437MHz							
4874	41.81	10.39	52.20	74	-21.80	Pk	Horizontal
4874	31.77	10.39	42.16	54	-11.84	AV	Horizontal
7311	40.65	12.68	53.33	74	-20.67	Pk	Horizontal
7311	26.69	12.68	39.37	54	-14.63	AV	Horizontal
4874	43.68	10.39	54.07	74	-19.93	Pk	Vertical
4874	30.74	10.39	41.13	54	-12.87	AV	Vertical
7311	41.45	12.68	54.13	74	-19.87	Pk	Vertical
7311	27.69	12.68	40.37	54	-13.63	AV	Vertical
TX 11b 2462MHz							
4924	41.34	10.39	51.73	74	-22.27	pk	Horizontal
4924	28.84	10.39	39.23	54	-14.77	AV	Horizontal
7386	40.57	12.68	53.25	74	-20.75	pk	Horizontal
7386	28.23	12.68	40.91	54	-13.09	AV	Horizontal
4924	43.84	10.39	54.23	74	-19.77	pk	Vertical
4924	30.65	10.39	41.04	54	-12.96	AV	Vertical
7386	40.61	12.68	53.29	74	-20.71	pk	Vertical
7386	28.73	12.68	41.41	54	-12.59	AV	Vertical

RESULT: PASS

Note:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.
2. Emission Level = Meter Reading + Factor
3. Margin = Emission Leve - Limit
4. All test modes had been pre-tested. The 802.11b mode is the worst case and recorded in the report.

No recording in the test report at least have 20dB margin.

12. BAND EDGE EMISSION

12.1. MEASUREMENT PROCEDURE

1)Radiated restricted band edge measurements

The radiated restricted band edge measurements are measured with an EMI test receiver connected to the receive antenna while the EUT is transmitting

2)Conducted Emissions at the bang edge

a)The transmitter output was connected to the spectrum analyzer

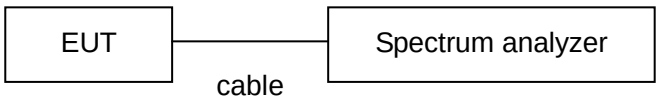
b)Set RBW=100kHz,VBW=300kHz

c)Suitable frequency span including 100kHz bandwidth from band edge

12.2. TEST SET-UP

Radiated same as 11.2

Conducted set up



12.3. Radiated Test Result

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type	
TX 11b 2412MHz							
2399.9	66.20	-13	53.20	74	-20.80	pk	Horizontal
2399.9	55.70	-13	42.70	54	-11.30	AV	Horizontal
2400	66.55	-12.99	53.56	74	-20.44	pk	Horizontal
2400	51.41	-12.99	38.42	54	-15.58	AV	Horizontal
2399.9	65.87	-12.97	52.90	74	-21.10	pk	Vertical
2399.9	54.11	-12.97	41.14	54	-12.86	AV	Vertical
2400	64.79	-12.94	51.85	74	-22.15	pk	Vertical
2400	54.27	-12.94	41.33	54	-12.67	AV	Vertical
TX 11b 2462MHz							
2483.5	65.93	-12.78	53.15	74	-20.85	pk	Horizontal
2483.5	55.46	-12.78	42.68	54	-11.32	AV	Horizontal
2483.6	65.77	-12.77	53.00	74	-21.00	pk	Horizontal
2483.6	54.01	-12.77	41.24	54	-12.76	AV	Horizontal
2483.5	66.70	-12.76	53.94	74	-20.06	pk	Vertical
2483.5	54.47	-12.76	41.71	54	-12.29	AV	Vertical
2483.6	66.63	-12.72	53.91	74	-20.09	pk	Vertical
2483.6	52.28	-12.72	39.56	54	-14.44	AV	Vertical

RESULT: PASS

Note: Scan with 11b,11g,11n, the worst casw is 11b Mode

Factor=Antenna Factor + Cable loss - Amplifier gain,

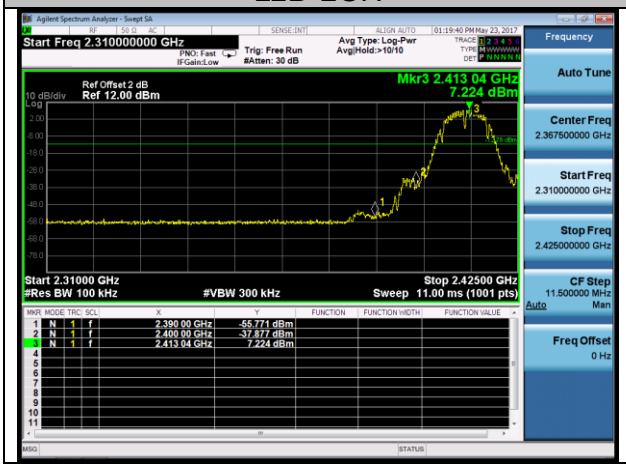
Emission Level = Meter Reading + Factor

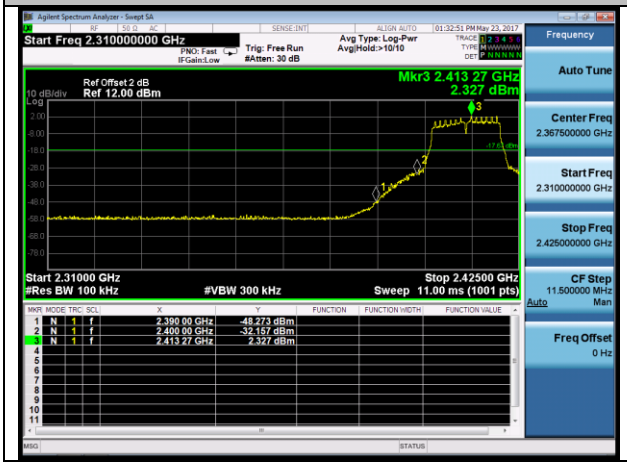
Margin= Emission Level -Limit.

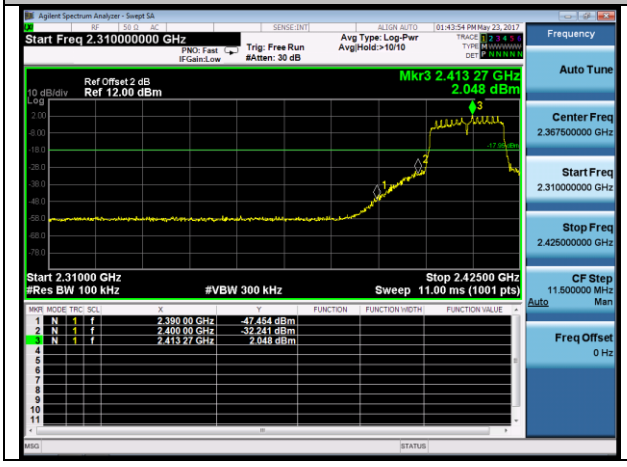
The “Factor” value can be calculated automatically by software of measurement system.

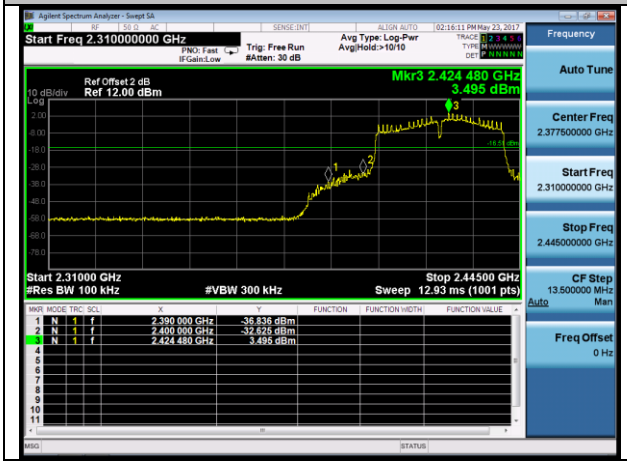
12.4. Conducted Test Result

Test Graph

11B-LCH	11B-HCH
	

11G-LCH	11G-HCH
	

11nHT20-LCH	11nHT20-HCH
	

11nHT40-MCH	11nHT40-HCH
	

13. FCC LINE CONDUCTED EMISSION TEST

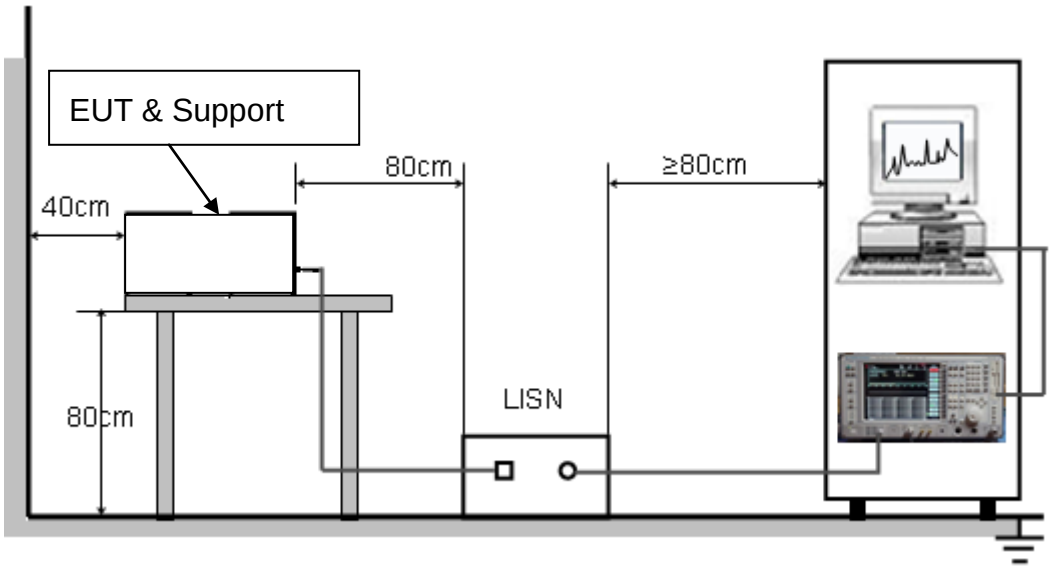
13.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

13.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



13.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received charging voltage by adapter which received 120V/60Hzpower by a LISN..
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

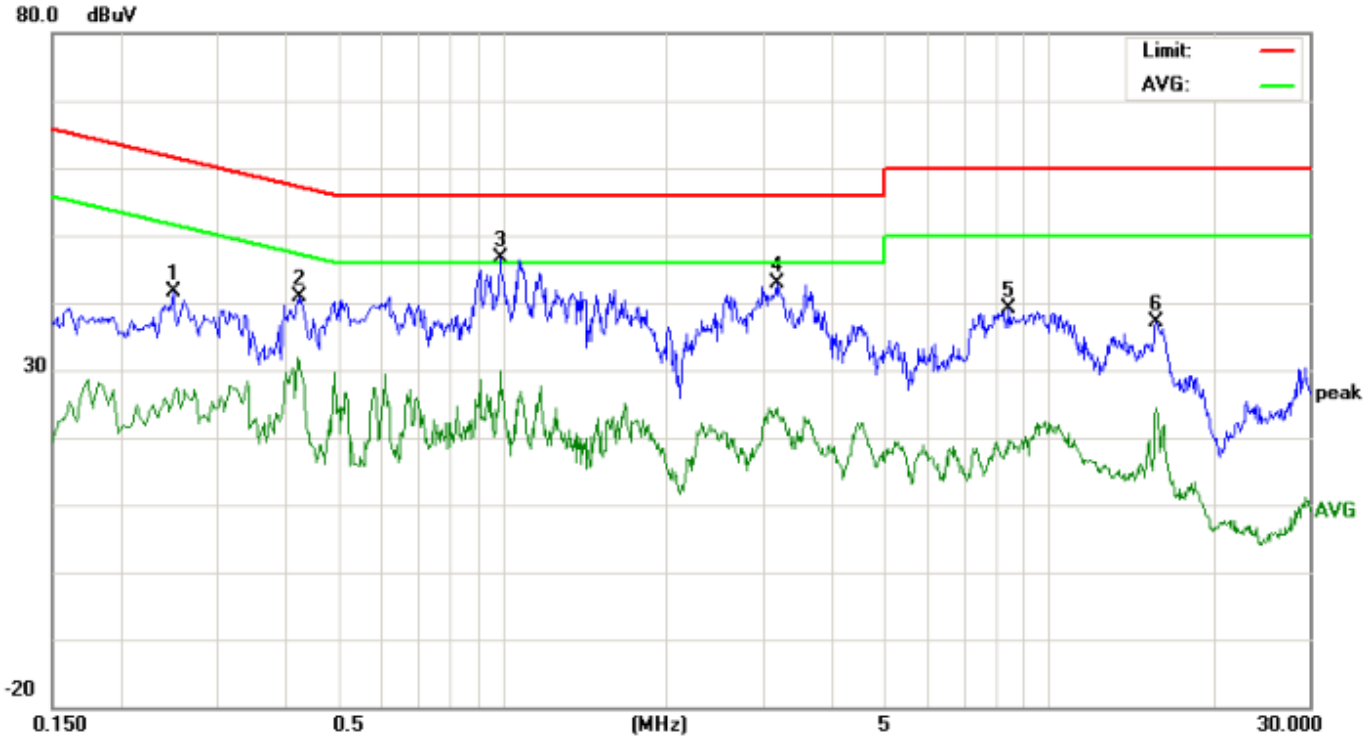
Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

13.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

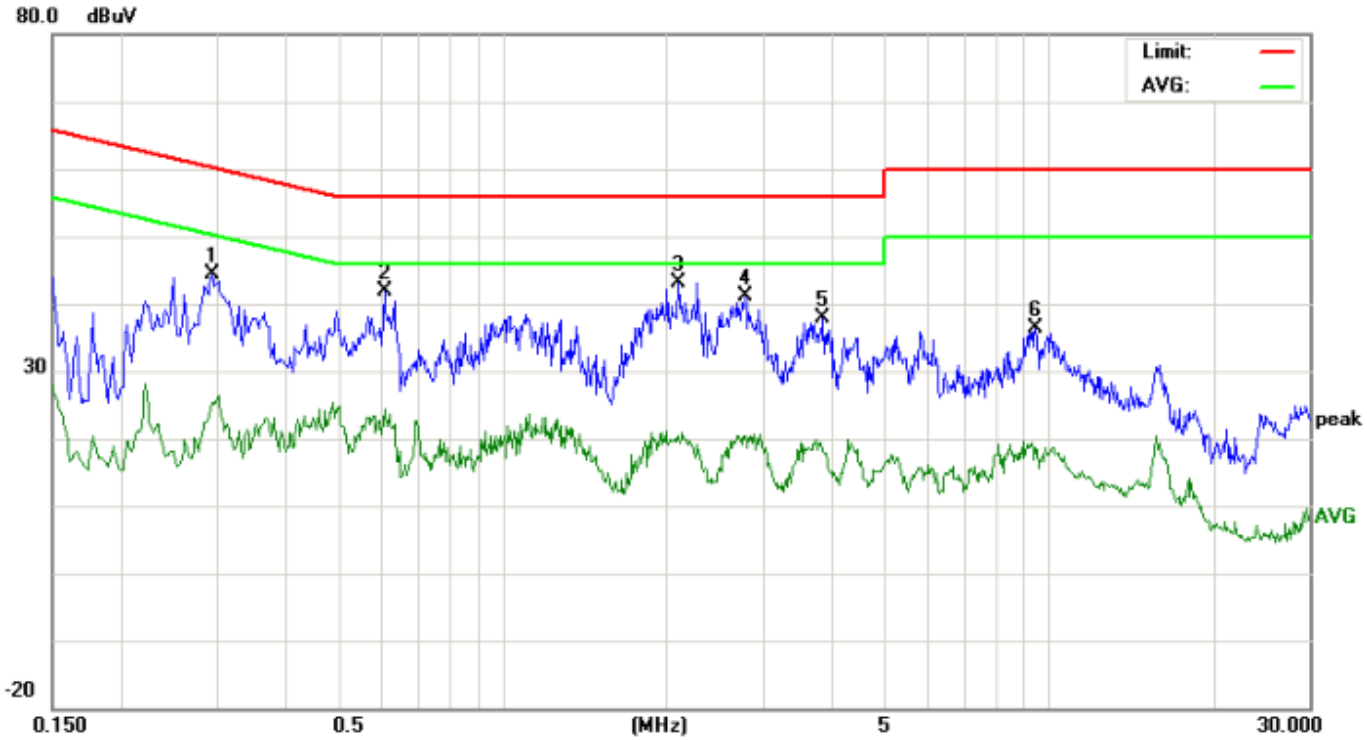
13.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

LINE CONDUCTED EMISSION TEST LINE 1-L



No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.2493	31.42		15.88	10.27	41.69		26.15	61.78	51.78	-20.09	-25.63	P	
2	0.4258	30.40		20.64	10.35	40.75		30.99	57.33	47.33	-16.58	-16.34	P	
3	0.9887	36.14		19.48	10.37	46.51		29.85	56.00	46.00	-9.49	-16.15	P	
4	3.1722	32.44		13.82	10.54	42.98		24.36	56.00	46.00	-13.02	-21.64	P	
5	8.4548	28.88		7.92	10.34	39.22		18.26	60.00	50.00	-20.78	-31.74	P	
6	15.7167	26.92		14.16	10.11	37.03		24.27	60.00	50.00	-22.97	-25.73	P	

Line Conducted Emission Test Line 2-N

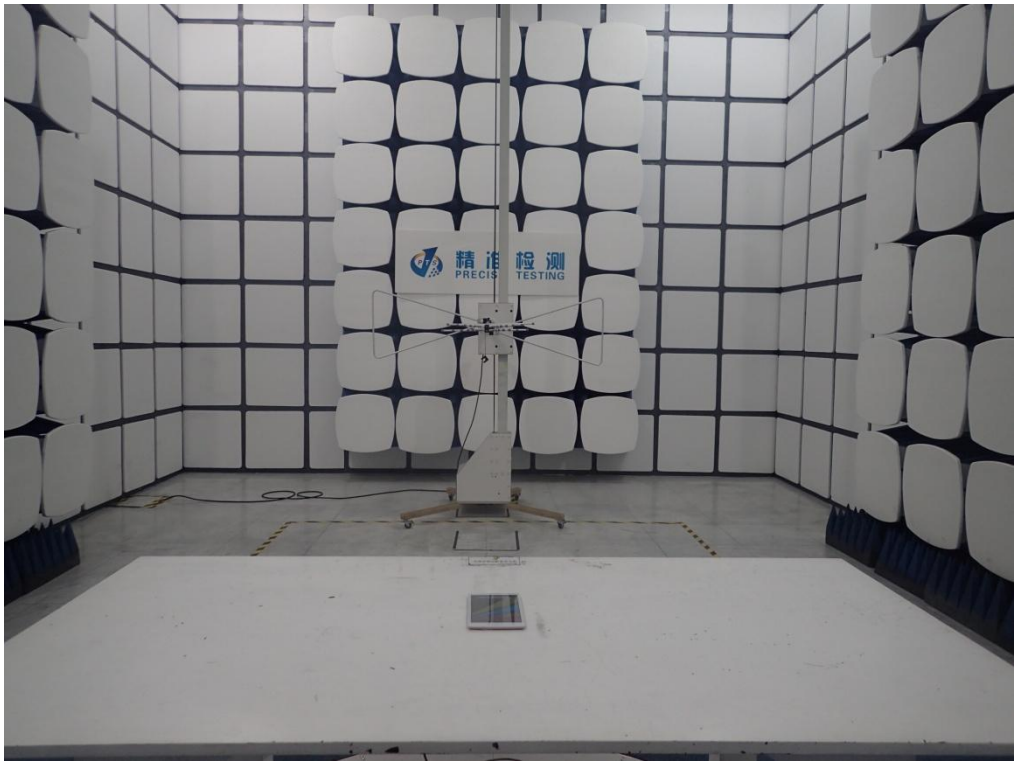


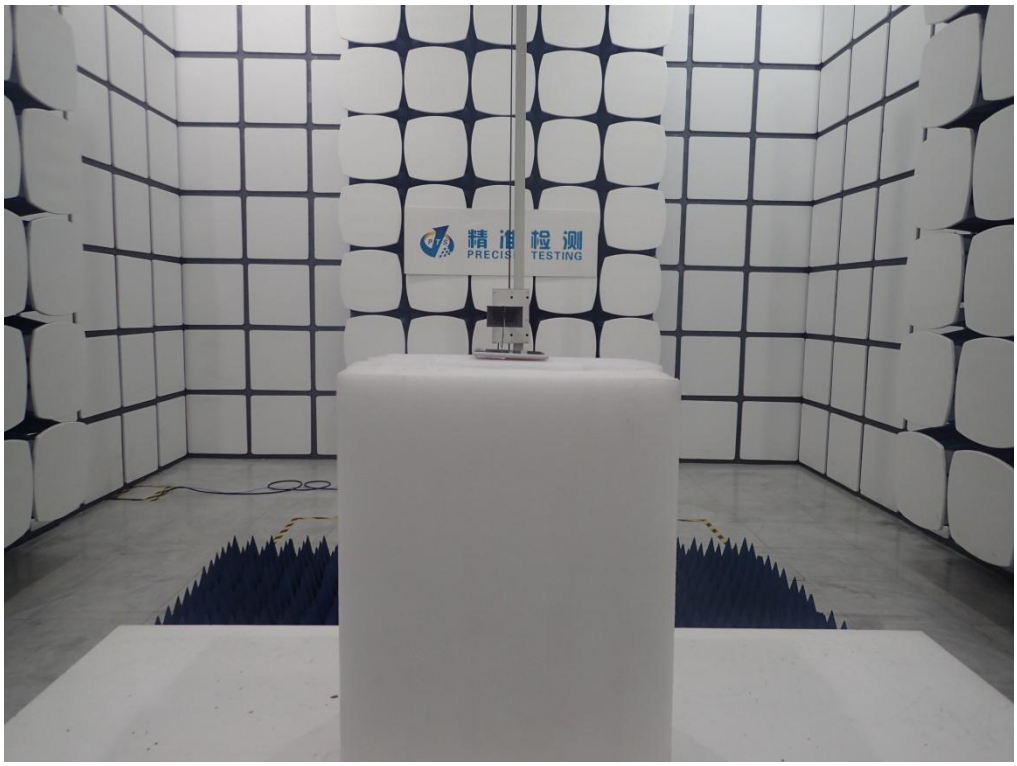
No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.2940	33.98		15.13	10.29	44.27		25.42	60.41	50.41	-16.14	-24.99	P	
2	0.6100	31.49		14.10	10.31	41.80		24.41	56.00	46.00	-14.20	-21.59	P	
3	2.1099	32.94		10.01	10.27	43.21		20.28	56.00	46.00	-12.79	-25.72	P	
4	2.7820	30.65		9.78	10.50	41.15		20.28	56.00	46.00	-14.85	-25.72	P	
5	3.8620	27.31		7.90	10.45	37.76		18.35	56.00	46.00	-18.24	-27.65	P	
6	9.4938	25.88		8.32	10.38	36.26		18.70	60.00	50.00	-23.74	-31.30	P	

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

LINE CONDUCTED EMISSION TEST SETUP

RADIATED EMISSION TEST SETUP





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